

Customer No.: 31561  
Docket No.: 13041-US-PA  
Application No.: 10/710,732

### REMARKS

#### Present Status of the Application

The Office Action dated April 6, 2007 rejected the specification and the claims 1-20 under 35 U.S.C 112, 1<sup>st</sup> paragraph, as failing to comply with the enablement. The Office Action also objected to the drawings for failing to show every feature of the invention specified in the claims. The Office Action further rejected claims 1, 4, 9 and 10 under 35 U.S.C. 102(e), as being anticipated by Rhodes (US 6,569,700), and claims 2 and 12 under 35 U.S.C. 103(a) as being unpatentable over Rhodes (US 6,569,700) in view of Czubyj et al. (US 5,180,690).

Claims 1-20 remain pending in the present application of which claims 1, 7, 14, 16, 18 and 20 have been amended to more accurately describe the present invention. It is believed that no new matter is added by way of these amendments made to the claims or otherwise to the application.

Applicant has most respectfully considered the remarks set forth in this Office Action. Regarding the obvious rejections, it is however strongly believed that the cited references are deficient to adequately teach the claimed features as recited in the presently pending claims. The reasons that motivate the above position of the Applicant are discussed in detail hereafter, upon which reconsideration of the claims is most earnestly solicited.

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**Discussion of Office Action Objections and Rejections**

*The Office Action rejected the specification and claims 1-20 under 35 U.S.C. §112, 1<sup>st</sup> paragraph as failing to comply with the enablement requirement.*

The Office Action contends that the specification is replete with terms which are not clear, concise and exact. The Office Action further indicates that in the claims that the applicant discloses the doped layer covers the interior walls of the trenches and the surface of the substrate within the photosensitive area (claim 1) and forming a buffer layer over the substrate wherein the buffer layer covers the interior walls of the trenches and the surface of the substrate within the photosensitive area (claim 16). The Office Action contends that the buffer and the doped layer are above the substrate (Figure 10) and they do not cover the surface of the substrate. Instead, they cover the surface of the well.

In response thereto, Applicants have thoroughly review the specification and amended terms to be more clear, concise and exact. Applicants respectfully submit that the well region is a region of a specific conductivity type in the substrate. Hence, the buffer and the doped layer can be construed as covering the surface of the substrate. Nevertheless, Applicants have amended the claims to recite the buffer and the doped layer covering the surface of the well region of the substrate. Reconsideration and withdrawal of the rejections are courteously requested.

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*The Office Action objected to the drawings under 37CFR 1.83(a) as failing to shown every feature of the invention specified in the claims.*

The Office contends that the claims (claim 1 and 16) recite the doped layer covers the interior walls of the trenches and the surface of the substrate within the photosensitive area and forming a buffer layer over the substrate wherein the buffer layer covers the interior walls of the trenches and the surface of the substrate within the photosensitive area, and the drawings illustrate these layers cover the surface of the well and not the surface of the substrate.

Applicants have amended the claims to recite the doped layer and the buffer layer covering the surface of the well region of the substrate to render the objection moot. Withdrawal of the objections is respectfully requested.

*The Office Action rejected to claims 1, 4, 9 and 10 under 35 U.S.C. 102(e) as being anticipated by Rhodes (US 6,611,037, Rhodes hereinafter).*

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a single prior art reference". "The identical invention must be shown in as complete details as is contained in the .... claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." See M.P.E.P. 2131, 8<sup>th</sup> ed., 2001.

Applicants respectfully traverse the 102(e) rejection for at least the reasons that Rhodes fails to teach or suggest each and every element of the claim in issue.

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The present invention is in general related to a method of fabricating a photodiode as claim 1 recites:

1. *A method of fabricating a photodiode, comprising the steps of:  
providing a substrate;  
forming a well region of a first conductive type in the substrate;  
forming an isolation structure in the substrate to define a photosensitive area on the substrate;  
forming a plurality of trenches in the well region of the substrate within the photosensitive area; and  
depositing a doped layer of a second conductive type over the well region of the first conductive type in the substrate, wherein the doped layer covers the interior walls of the trenches and the surface of the well region of the first conductive type in the substrate within the photosensitive area.*

The Office alleges that the photosite 326 of Rhodes is comparable to the doped layer of the invention. As disclosed by Rhodes in col. 10, lines 1-7, the photosite 326 is formed by ion implantation via a series of angled implants. Rhodes further teaches that typically a series of four angled implants is performed to assure a more uniformly doped trench sidewall. The present invention, on the other hand, teaches depositing the doped layer, which is accomplishable in a single deposition process.

Therefore, Applicants respectfully submit that independent claim 1 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 2-15 patently define over the prior art as a matter of law, for at least the reason that these dependent claims contain all features of independent claim 1.

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*The Office Action rejected claims 2 and 12 under 35 U.S.C. 103(a) as being unpatenable over the Rhodes (USP 6,611,037) in view of Czubytyj et al. (USP 5,180,690, Czubytyj hereinafter).*

With regard to the 103 rejections of claim by Rhodes in view of Czubytyi, Applicants respectfully submit that this claim defined over the prior art references for the reasons discussed above.

For at least the reasons that Czubytyi does not teach or suggest depositing a doped layer of a second conductive type over the well region of the first conductive type in the substrate, wherein the doped layer covers the interior walls of the trenches and the surface of the well region of the first conductive type in the substrate within the photosensitive area, the combination of Rhodes and Czubytyi still fails to render claims 2 and 12 unpatentable. Withdrawal of the rejection is respectfully requested.

*The Office Action rejected claims 5-8, 11 and 15 under 35 U.S.C. 103(a) as being unpatenable over the Rhodes (USP 6,611,037) in view of Nishizawa et al. (USP 4,866,500 Nishizawa hereinafter).*

With regard to the 103 rejections of claim by Rhodes in view of Nishizawa, Applicants respectfully submit that this claim defined over the prior art references for the reasons discussed above.

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Additionally, the present invention is directed to a method of fabricating a photodiode, while Nishizawa is directed to a method of fabricating a thyristor. Hence, Nishizawa is a nonanalogous art and is not combinable with the remaining prior art reference. Withdrawal of the rejection is respectfully requested.

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**CONCLUSION**

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

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